

Name: _____

ID Number: _____

Time: 2 hours

1 H 1.008																	2 He 4.003
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La* 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226	89 Ac[†] (227)															

QUESTION	SCORE	MAXIMUM MARKS
1		
2		
TOTAL		

QUESTION 1

(a) Complete the following statements:

(i) Amino acids are building blocks of _____. Amino acids differ by the

R group called _____. Two amino acids join together by the

reaction called _____ to form a _____ bond which

is also known as _____. A linkage of many amino acids is called a

_____ chain. In this chain, each amino acid unit is called an amino

acid _____. The elements found in **all** 20 amino acids are

_____.

Since these elements are found in large amounts in the human body, they are classified as

_____ elements. There is an additional element found in cysteine and

_____ : its name is _____ and it is classified as

a _____ element because of its amount in the human body. When two

cysteine molecules react together by oxidation a _____ bond is formed and

the name of the product (new substance) is _____. An example of a protein

that contains this type of bond is _____.

The difference between isoleucine and leucine is that

On the other hand, the difference between glutamic acid and glutamine is that

(ii) The elements that are important for the strength of bones are

Iron is well known for its function in the protein called _____ which carries

oxygen from the _____ to the body tissues where it is used to oxidise

glucose and produce heat energy, water and _____. This protein is

found in _____ cells. Iron is a _____ element

because it occurs in very small amounts in the human body. A deficiency of iron in humans causes

_____. Iodine and _____ are essential to humans to

prevent _____ and tooth decay, respectively.

(iii) According to the Bohr model, electrons in atoms are found in

However, the _____ model

has shown mathematically that electrons are found in atomic orbitals. An atomic orbital is defined

by a specific _____ which is one of the solutions of the

_____ equation. In simple terms, we can define an atomic orbital

as _____

The size of an atomic orbital cannot be described precisely since the

of finding an electron outside the nucleus never becomes zero. Therefore, for the hydrogen 1s

orbital a radius of the sphere that captures 90-95% of the _____ is used for

the size of the orbital. In the hydrogen atom, the most probable distance of the electron from the

nucleus is _____. Atomic orbitals in a _____ of any

atom are described as _____ because they are identical in energy. The

p orbitals have two _____ that lie directly on the _____. The

number of atomic orbitals at any given energy level is _____ with a maximum

number of electrons which is _____. A substance can be paramagnetic or diamagnetic.

Magnetically, copper(I) ion is _____ because _____

_____ and it is _____ by a magnetic field.

(iv) $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ is hydrated whereas FeCl_3 is _____

(v) The two classes of pure substances are _____

(vi) The name of the simplest aldehyde is _____ whereas the names of

the simplest carboxylic acid and ketone are _____ and _____, respectively.

(vii) Two properties of solutions are: _____

(b) Write the **name** of each of the following substances:

$\text{HNO}_2(aq)$ _____

PI_3 _____

CsClO_2 _____

FeHPO_4	_____
$\text{Ni}(\text{SCN})_2$	_____
^2H	_____
TiN	_____
$\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$	_____
$\text{Al}(\text{HSO}_3)_3$	_____
BrO	_____

(d) Write a formula for each of the following substances:

Silver nitrate	_____
Manganese(II) carboxylate hydrate	_____
Ammonium dichromate	_____
Strontium peroxide	_____
Zinc hydrogen sulfide	_____
Phosphoric acid	_____
Cobalt(II) sulfate heptahydrate	_____
Mercury(I) iodide	_____
Calcium hydrogen carbonate	_____
Tin(IV) bromate	_____

QUESTION 2

(a) Draw the Lewis dot symbol of the following:

(i) Arsenic

(ii) The hydride ion

(b) Give all possible Lewis structures of the azide ion, N_3^- .

(i) Which one of the structures of N_3^- you have drawn is the **best**? Why?

(ii) The conjugate acid of N_3^- is hydrazoic acid (**HN_3**).

Look carefully at the Lewis structures of N_3^- which you drew above and then draw below the molecular shape of **HN_3** .

(c) Determine the **polarity** of each of the substances indicated below. **Show your reasoning.**

(i) *trans*- N_2F_2

(ii) XeOF_4

(d) Give the chemical formula of each of the following substances:

(i) an alkyne _____

(ii) citric acid _____

(iii) a cycloalkene _____

(e) Give a line drawing of the following substances:

(i) isopropylcyclohexane (chair conformation)

(ii) a carboxylic acid anhydride

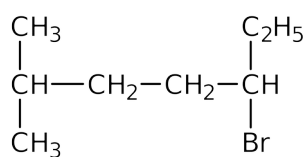
(ii) a nitrile with a quaternary carbon

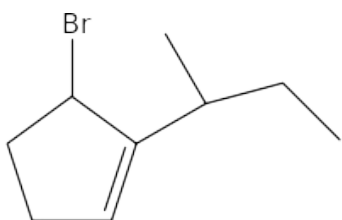
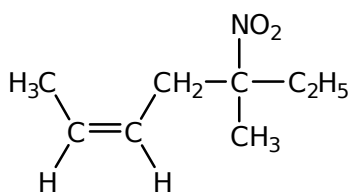
(iv) an imine formed from a ketone

(f) (i) **Draw** all the possible isomers of C_4H_8 and **name** them.

(ii) Look carefully at the structures of the isomers you have drawn above.
What types of isomers
are represented these structures?

(g) Give the correct name for each of the following compounds:





(h) Draw the structure of each of the following compounds:

Lactic acid

1,4-dichloro-3-methyl-2-heptyne

(i) The following are structures of pain relievers that can be bought from a pharmacy. Study them very carefully. Then **draw a circle** around each **functional group** and **name** it.

What is the name of the **alkyl group** in **ibuprofen**?
